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Aldersladia magnificus: a new genus and species of hydromedusa (Cnidaria: Hydrozoa: Leptomedusae: Aequoreidae) from tropical and subtropical Australia

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ABSTRACT

A new genus and species of aequoreid hydromedusa is reported from the Northern Territory, Queensland, and Western Australia. It differs from other genera in the family in having one or more conspicuous, solid, gelatinous papillae underlying the radial canals and gonads.

KEYWORDS: *Aldersladia magnificus,* taxonomy, new genus, new species, Aequoreidae, Hydrozoa, Cnidaria, Northern Territory, Queensland, Western Australia.

INTRODUCTION

The biodiversity of Australian medusae has been previously unappreciated, especially with regard to the smaller, less conspicuous hydromedusae. Historically, relatively few species have been studied, and most were so vaguely described that they remain unrecognisable. Most of the medusae described by Péron and Lesueur (1810) from northern Australian waters have proven unrecognisable, including several new species of Aequoreidae. Haeckel (1879) treated several species of Australian aequorids, but many of his conclusions were disregarded by later workers for being unsuccessful, 'except from an artistic point of view' (see Browne 1916). Mayer (1915), while sampling through the Great Barrier Reef region and southern Papua, observed that north-eastern Australia was particularly notable for its lack of medusan diversity. Kramp (1953) found a considerable diversity of tropical eastern Australian hydromedusae in general, but treated only four species of Aequoreidae. It seems that most of the workers who have treated tropical Australian medusae have observed relatively high biodiversity in general (i.e., many dozens of species), including numerous different aequoreid species, but have not necessarily appreciated the uniqueness of the regional aequorid fauna. In studying the Australian medusozoan fauna over the last eight years, I have come to the conclusion that the biodiversity has been grossly underestimated, particularly with respect to the Aequoreidae. A revision of the Australian Aequoridae is underway (Gershwin in prep.), with this species, *Aldersladia magnificus* gen. and sp. nov., being one of the most abundant and conspicuous.

Kramp (1961a) and Stiasny (unpublished museum identifications) both had the opportunity to study the species described herein, but neither regarded it as unique. The species is most closely similar to *Aequorea pensilis* (Eschscholtz), which also occurs in Australian waters. However, *Aldersladia magnificus* gen. and sp. nov. has several structural characters which separate it from *A. pensilis*, most conspicuously the subumbrellar papillae; even in badly damaged specimens lacking all epithelial tissue, the stiff gelatinous papillae are intact. This character of having the papillae underlying the radial canals, by definition, precludes this species from being in the genus *Aequorea*.

MATERIALS AND METHODS

The collections of Aequoreidae held in various Australian museums were examined. Additional material was collected by hand using plastic bags or glass jars while snorkeling, or by hand-trawling with a 500 µm mesh, 0.5 m wide plankton net.

Live material was relaxed in magnesium chloride (added dropwise) prior to examination and photography, then fixed in 5–10% formalin. Measurements were made with Max-Cal digital calipers to the nearest 0.01 mm. Every effort was made to obtain true dimensions across the widest points; however, some specimens were too brittle to be spread out, in which case absolute measurements were taken across the two farthest available points. Bell diameter (BD) and stomach diameter (SD) were measured with the specimen lying exumbrella-down, and bell height (BH) was measured with the specimen lying on its side. Nematocysts were examined and measured with a Leica DMLB compound microscope and Leica IM-50 Image Manager v. 1.20 for Windows; all observations and photographs were made through a 40x objective,

unless otherwise specified. Nematocysts were identified following the keys of Mariscal (1971), Calder (1974), and Williamson *et al.* (1996).

Abbreviations used: Australian states are abbreviated as follows: South Australia (SA), Western Australia (WA), Northern Territory (NT), Queensland (QLD). The Great Barrier Reef is abbreviated 'GBR'. Institutional abbreviations used: Australian Museum, Sydney, NSW (AM); Museum and Art Gallery of the Northern Territory, Darwin, NT (NTM); South Australian Museum, Adelaide, SA (SAM); and Western Australian Museum, Perth, WA (WAM). Other abbreviations: specimen numbers prefixed with an 'A' are from the collection of the late Ronald V. Southcott (RVS), now housed at the SAM.

SYSTEMATICS

Order Leptomedusae Haeckel, 1879
Family Aequoreidae Eschscholtz, 1829
Aldersladia gen. nov.

Type species. Here designated, *Aldersladia magnificus* n. sp.

Diagnosis. Aequoreidae with subumbrellar gelatinous papillae underlying radial canals.

Remarks. According to Kramp (1961b) and Mayer (1910), the chief designation of the genus *Aequorea* from the others in the Aequoreidae is that *Aequorea* lacks subumbrellar papillae. In contrast, *Zygocanna vagans* Bigelow and *Rhacostoma atlanticum* Agassiz, possess subumbrellar papillae in rows between the radial canals, and *Gangliostoma gnangdongensis* Xu, has papillae at the base of the manubrium. Thus, it appears of generic importance to have the papillae underlying the radial canals.

Description. As for type species, *Aldersladia magnificus*.

Etymology. Named to honour Dr Philip Alderslade, whose interest in jellyfishes has revealed many new species. In addition, Phil's kindness and generosity enabled me to accomplish much interesting science. Gender masculine, but taking the '-ia' ending following Article 30.2.2 (ICZN 1999) and medusozoan taxonomic tradition for honorific names.

Aldersladia magnificus sp. nov.

(Figs 1–5; Table 1)

Aequorea pensilis. – Kramp 1953: 295 (N. QLD); Kramp 1961a: 202 (Cairns, QLD); ?Kramp 1965: 94 (Brisbane). Not *Aequorea pensilis* (Eschscholtz).

Material examined. HOLOTYPE – NTM C12563, 20 August 1998, Fort Hill Wharf, Darwin, NT, at surface; with parasitic hyperiid amphipod, *Lestrigonus bengalensis* Giles, 1887, on lateral surface of exumbrella. PARATYPES – NTM C5375, 20 March 1986, Vestey's Beach, Darwin; NTM C12226, 11 September 1994, off mouth of Nayarnpi Creek, Roper River, NT, depth 1 m, over hard sand bottom; NTM C11997, 29 March 1993, Casuarina Beach, Darwin, NT; NTM C12565, Casuarina Beach, Darwin, NT, 29 March 1993; SAM H913 (=RVS A796), 20 April 1964, Darwin Harbour, 1 m over 2 m depth sandy bottom, with commensal amphipods; SAM H914 (=RVS A793), Darwin Harbour, 20 April 1964, 1 m over 2 m depth, sandy bottom; SAM H915 (=RVS A369), Cairns Esplanade, N. QLD, 5 February 1959 (erroneously identified as *Aequorea pensilis* by Kramp 1961a); SAM #H916 (=RVS A84), Cairns Dist., N. QLD, January 1957, poor condition; SAM H1042, Fannie Bay Beach, Darwin Harbour, Darwin, NT, 4 January 1999; SAM H1036-H1041, same data as H1042, coll. 5 January 1999; AM G13098, Port Denison, QLD, 1924, 2 specs, fragmented (erroneously identified as *A. pensilis* by Stiasny, unpublished); AM G13091, 3 poor specs, Port Denison QLD, 1924; AM G13100, 3 specs, Bowen Beach, Port Denison, QLD, washed up, 1924; SAM H936, Fremantle Channel, WA, in drift line, 15 March 1999; female; SAM H987, data as for SAM H936, damaged; WAM Z2925, data as for SAM H936, damaged margin; AM G13098, Bowen Harbour, Port Denison, QLD, 20° 11'S 148° 15'E, 1924; AM G13091, same data as AM G13098; AM G13100, same data as AM G13098; QM G304073, Reef Point, Redcliffe, QLD, 2 July 1950.

Description. Bell hemispherical or higher (Fig. 1), to 92 mm diameter, more often about 40–60 mm, with jelly of a tough and rubbery consistency. Subumbrella (Fig. 2) with distinctive gelatinous papillae, singly to several in a row beneath radial canals; shape of papillae typically conical, compressed on both sides (Fig. 3).

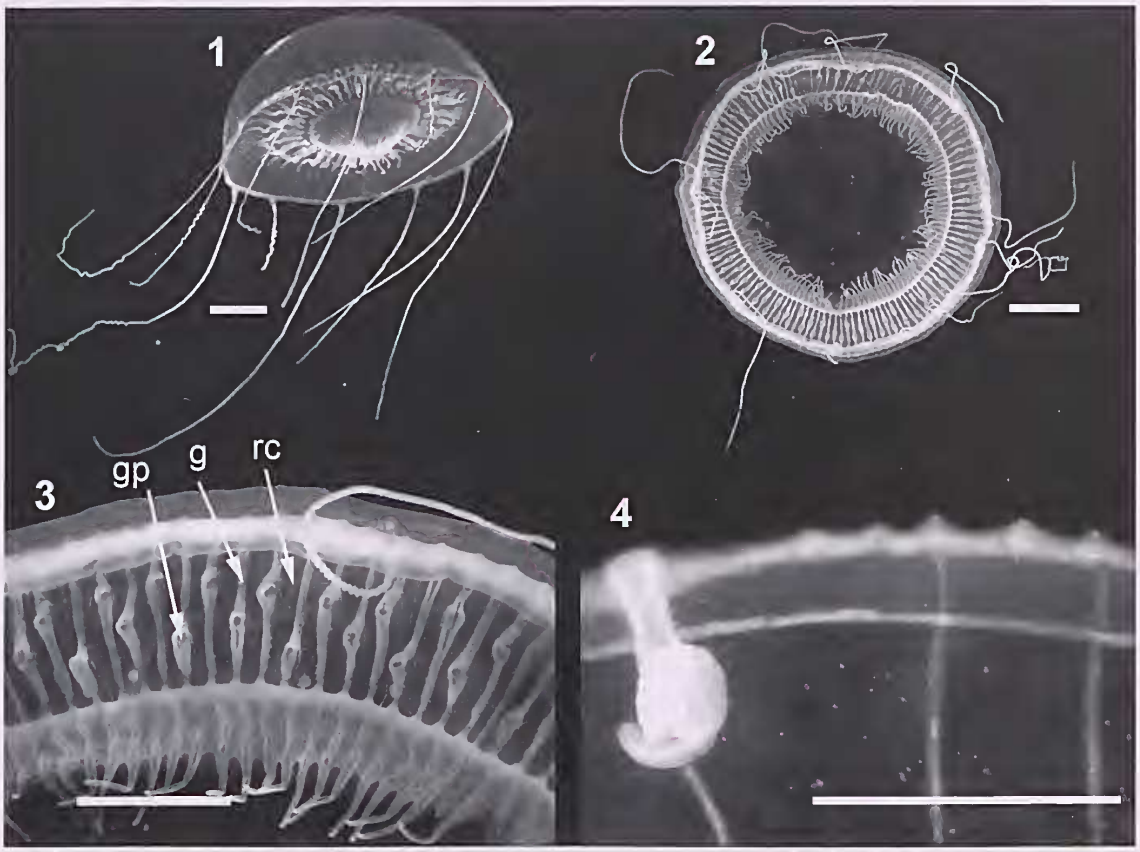
Radial canals approximately 150, generally increasing with body diameter (Table 1); mostly simple, a few forked near margin in some specimens. Gonads bilamellar, along nearly entire length of radial canals, reaching stomach but stopping short of margin.

Tentacles 12–16, hollow, coiled (Table 1); approximately 1–2 times as long as bell diameter when relaxed. Tentacle bulbs broadly triangular to rectangular, with rounded or blunt lateral extensions. Rudimentary tentacle bulbs 6–13, typically about 10, between adjacent tentacles; conical. Statocysts typically three between adjacent tentacles and rudiments, each with two concretions; apparently easily lost. Excretory papillae conspicuous beneath most tentacles and marginal papillae (Fig. 4).

Stomach large, approximately 60% of bell diameter, with gaping mouth over large, shallowly convex, gelatinous mass. Solid external ribs on the stomach wall numbering the same as, and continuous with, lips and radial canals. Lips long and pointed, with shallow furrow down centre on inside.

Colour transparent, from faintly whitish to greenish blue along radial canals and tentacles, with colourless mesoglea.

Tentacular nematocysts of two types (Fig. 5, from holotype): firstly, broad egg-shaped isorhizas, 20.56–29.23 μm long by 15.81–19.46 μm wide (n = 24), and



Figs 1–4. *Aldersladia magnificus* gen. and sp. nov. **1,** whole medusa, subumbrellar-lateral view, in life; **2,** holotype, subumbrellar view, preserved; **3,** holotype, close-up of the gelatinous papillae (gp) underlying the radial canals (rc) and gonads (g); **4,** close-up of the margin; note the numerous marginal warts with exeretory papillae. In Figures 1 and 2, scale bar = 1 cm; in Figures 3 and 4, scale bar = 0.5 cm.

secondly, narrow, tongue-shaped, unidentified, of similar length but half as wide (in a few cases, the second type was seen to have a single loop of an extremely fine thread, but no shaft or other identifying features were observed).

Fig. 5. *Aldersladia magnificus* gen. and sp. nov. holotype, nematocysts: A = primary nematocysts (isorhizas); B = unidentified nematocysts. Scale bar = 25 µm.

Intraspecific variation. In most specimens, the papillae occur under nearly every canal, with papillae lying in approximately two whorls, most often three distal to every one proximal. In a minority of specimens, the papillae occur beneath alternating radial canals, with the papillated canals being thicker and heavier than those lacking papillations. A few specimens have multiple papillae per canal. In some specimens, part of the body contains alternating papillated canals, whilst the other half contains adjacent papillated canals. In the holotype, most canals contain papillae, which alternate proximal-distally along the canals. It is interesting to note that the three WA specimens differ slightly from all the others, in having undulating radial canals and apparently only 5–10 tentacles (estimate based on widely-spaced tentacles in areas of intact margin). All three specimens are damaged – thus I do not know the reliability of these characters.

It is conceivable that this variation in expression of the papillae represents multiple species. However, there did not appear to be reliable geographical difference in expression, nor were there other obvious morphological differences which might be regarded as species-diagnostic. Thus, I am taking a conservative approach in regarding

Table 1. Measurements of *Aldersladia magnificus* gen. and sp. nov. specimens, arranged in ascending order of bell diameter to show corresponding increase in tentacle and radial canal number. Those with missing data lacked margins or were worn and could not be evaluated.

Specimen no.	Total diam. (mm)	Stomach diam. (mm)	Tentacles, no.	Radial canals, no.
H916	27	15	12+	68+
G13098b	28	18	–	117
C12565	31	19	–	128
C12226	32	14	12	59
H1041	34	20	2++	144
H1038	35	19	4++	118
H915	35	20	19	80
H1040	37	26	13	146
H1039	38	26	0++	155
G304073	38	21	11	83
C5375	39	27	11	150
C12563 (holotype)	41	29	12	131
H1036	42	28	4++	156
H1042	44	26	15	125
H987	44	32	–	–
H913	45	31	13	153
H1037	52	32	16	144
H914	57	39	16	166
H936	62	40	5+	136
C11997	62	40	–	139
G13098a	63	42	16	153
Z2925	66	38	–	140
G13091a	74	50	–	–
G13091b	84	47	–	–
G13091c	87	52	–	–
G13100a	87	46	–	–
G13100b	90	45	–	–
G13100c	92	55	–	–

the number and arrangement of papillae to be variable in this one species, while hoping that this question stimulates further research interest.

Associations. This species is often found with evidence of exumbrellar parasitisation; the hyperiid amphipod symbionts on the holotype were identified as females and young of *Lestrigonus bengalensis* (W. Zeidler pers. comm., September 1998).

Etymology. I have chosen the specific name *magnificus*, because the medusa is truly a magnificent one to behold. In life, it is crystal-clear, with faintly blue-tinted canals and few coiled tentacles, giving the medusa a delicate and elegant appearance.

Type locality. Fort Hill Wharf, Darwin Harbour, Darwin, NT.

Distribution. Currently known from Moreton Bay, S.E. Queensland, to Fremantle, Western Australia. Common in Darwin Harbour.

Systematic remarks. *Aldersladia magnificus* has previously been misidentified as *Aequorea pensilis* (Stiasny unpublished; Kramp 1961a). It is unclear why both appeared to ignore the conspicuous subumbrellar papillae (specimens AM G10398 and SAM H915, respectively). In addition, specimens possibly referable to this species have been identified as belonging to *A. pensilis* (Kramp 1953, 1965), though material is unavailable for study.

It is a mistake to confuse *A. pensilis* with *Aldersladia magnificus*. In all figures and written descriptions of *A. pensilis*, the subumbrellar papillae are entirely absent (see especially photographs in Bigelow (1919) and in Russell (1953)), though they are immediately conspicuous in the present collection. Even in damaged specimens lacking all traces of tentacles, gonads, and stomach, these papillae are prominent. Thus, it is apparent that *A. pensilis* lacks the subumbrellar papillae, whereas *Aldersladia magnificus* possesses them, and both species are valid. In addition, the exeretory papillae are prominent in *A. magnificus* but absent in *Aequorea pensilis*. Furthermore, Kramp (1961a) describes *Aequorea pensilis* as having "statocysts very numerous," yet they number only about three between adjacent tentacles and rudiments in *Aldersladia magnificus*. I have seen only two Australian specimens that I believe are true *Aequorea pensilis*, both from far northern Queensland,

whereas *Aldersladia magnificus* is common along the tropical coasts of Australia.

Péron and Lesueur (1810) described two species with subumbrellar papillae from northern Australia, namely *Aequorea bunogaster* and *A. phosperiphora*. It is possible that *A. magnificus* can be attributed to one or both of these species; however, the descriptions are too vague for confirmation, no material exists for study, and both have been considered unrecognisable for nearly 200 years. Rather than resurrecting one or both of these obsolete names and the uncertainty inherent in doing so, it seems more conservative to start fresh with ample material and a certain identity.

The only other aequoreid that *A. magnificus* could possibly be confused with is *Aequorea papillata* Huang and Xu; however, this would be confused in name only, as the description and figures provide no evidence of subumbrellar papillae, being instead on the manubrium (Huang and Xu 1994). *Aequorea papillata* is said to have spherical-shaped lateral extensions on the tentacle bulbs, and spherical marginal warts; both characters are similar to *A. parva* Browne, but differ in possessing exeretory papillae.

The function of the papillae is unknown. This was questioned in review and thought to perhaps be from parasitism. They appear too symmetrical on each specimen and too prevalent throughout the species to be a direct result of parasitism, and I believe that a hypothesis of some sort of allergic reaction to parasitism would be far-fetched and unsubstantiated. I believe them to be fully structural, as are, presumably, those of *Rhacostoma atlanticum*.

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